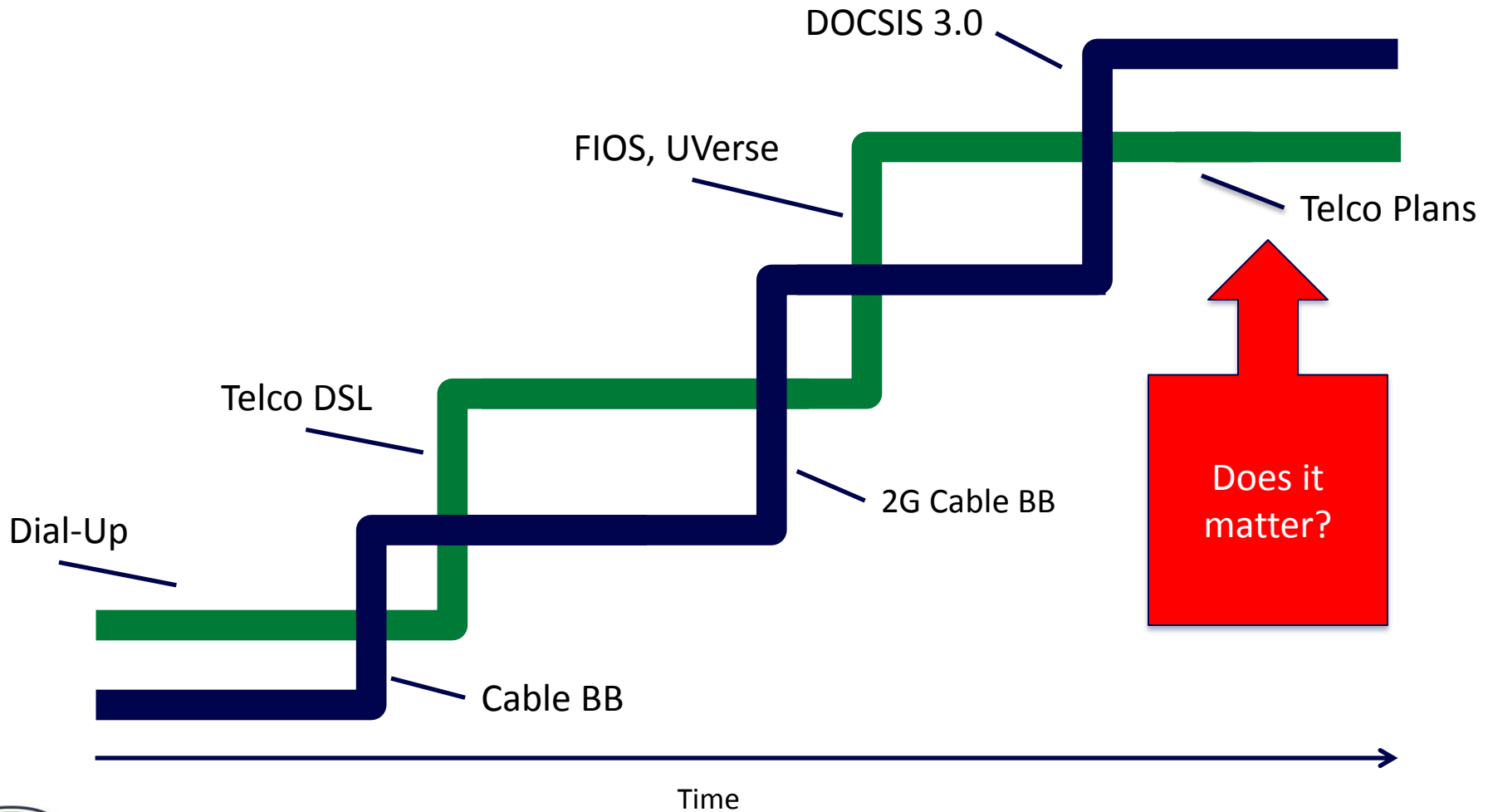




# **The Next Upgrade:** Providing Arizona a Strategic Bandwidth Advantage

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For the first time since the beginning of the commercial internet, there are no plans for a national wired provider to build a faster network than the leading network



# Agenda

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- The what and why of a strategic bandwidth advantage
- The difficult math for the next American upgrade
- Changing the math
- Background and status of Gig.U
- Steps moving forward



# **THE WHAT AND WHY OF A STRATEGIC BANDWIDTH ADVANTAGE**

# A strategic bandwidth advantage

## A Bandwidth Advantage

**More bandwidth everywhere, at prices such that the average person has more bandwidth than in other countries**

**What we used to have; What Korea, Japan and others have now; What we are unlikely to ever have ever again**

## A Strategic Bandwidth Advantage

**Fast enough and cheap enough bandwidth to the right places to provide an advantage over other countries in driving bandwidth based innovation and economic growth**

**What University R&E networks gave us in the first two decades of the Public Internet; what our country can achieve; what our communities want**



# Bandwidth, unlike dial tone, has multiple variables

What does a  
Farmer and  
a Doctor  
need?



25 years  
ago

Dial tone

Dial Tone

Today

Mobile Data

Enough Bandwidth for  
real time collaboration  
with an MRI



# New inputs drive economic growth

1800's

- Access to new forms of power (steam engines)
- Access to new forms of transportation (canals, then trains)

1900's

- Access to new forms of power (electricity)
- Access to new forms of transportation (cars, trucks and planes)

2000's

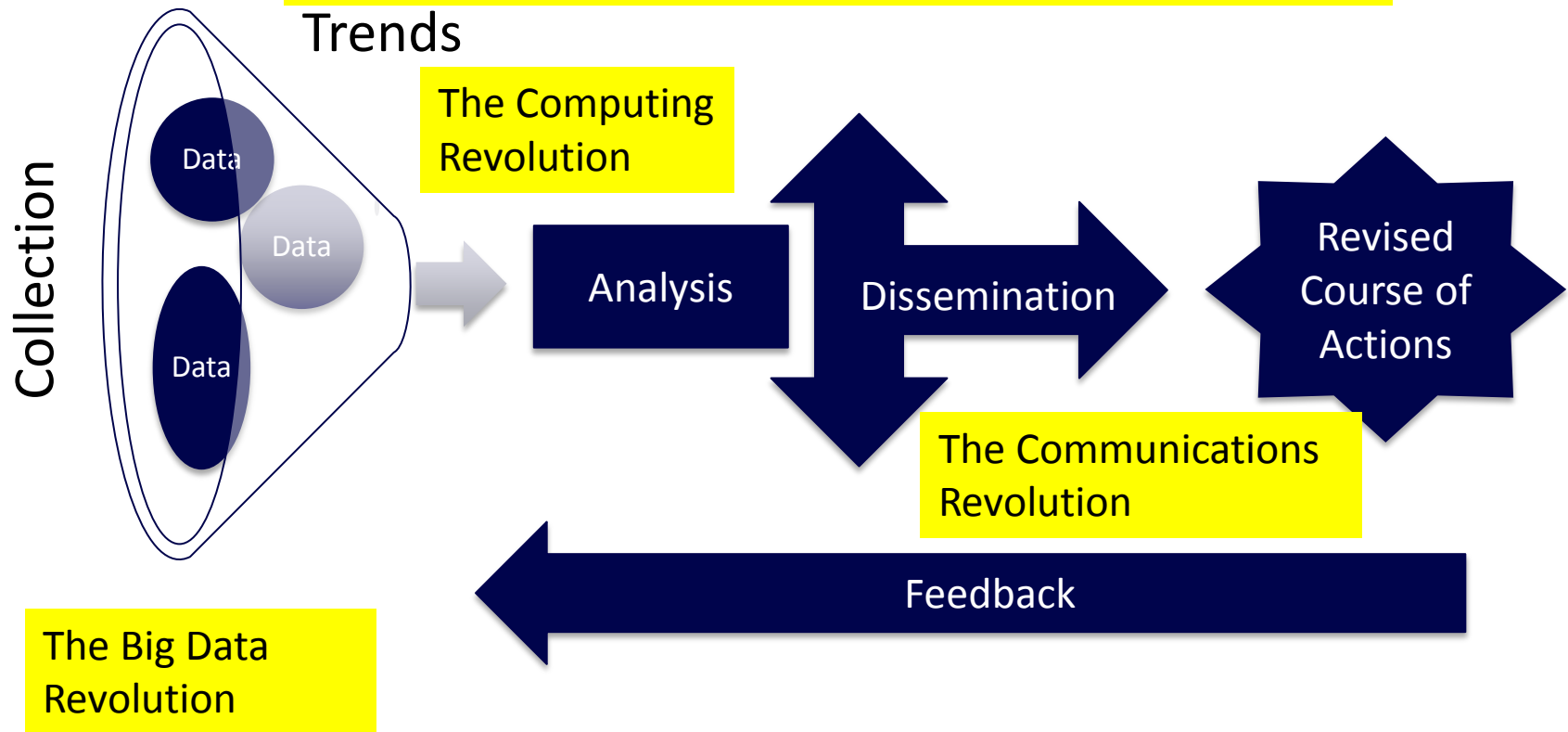
- Access to computing power
- Access to data storage
- Access to digital communications

Fastest growing parts of the economy are those that best use new inputs



# The Fundamental Task of Knowledge Exchange

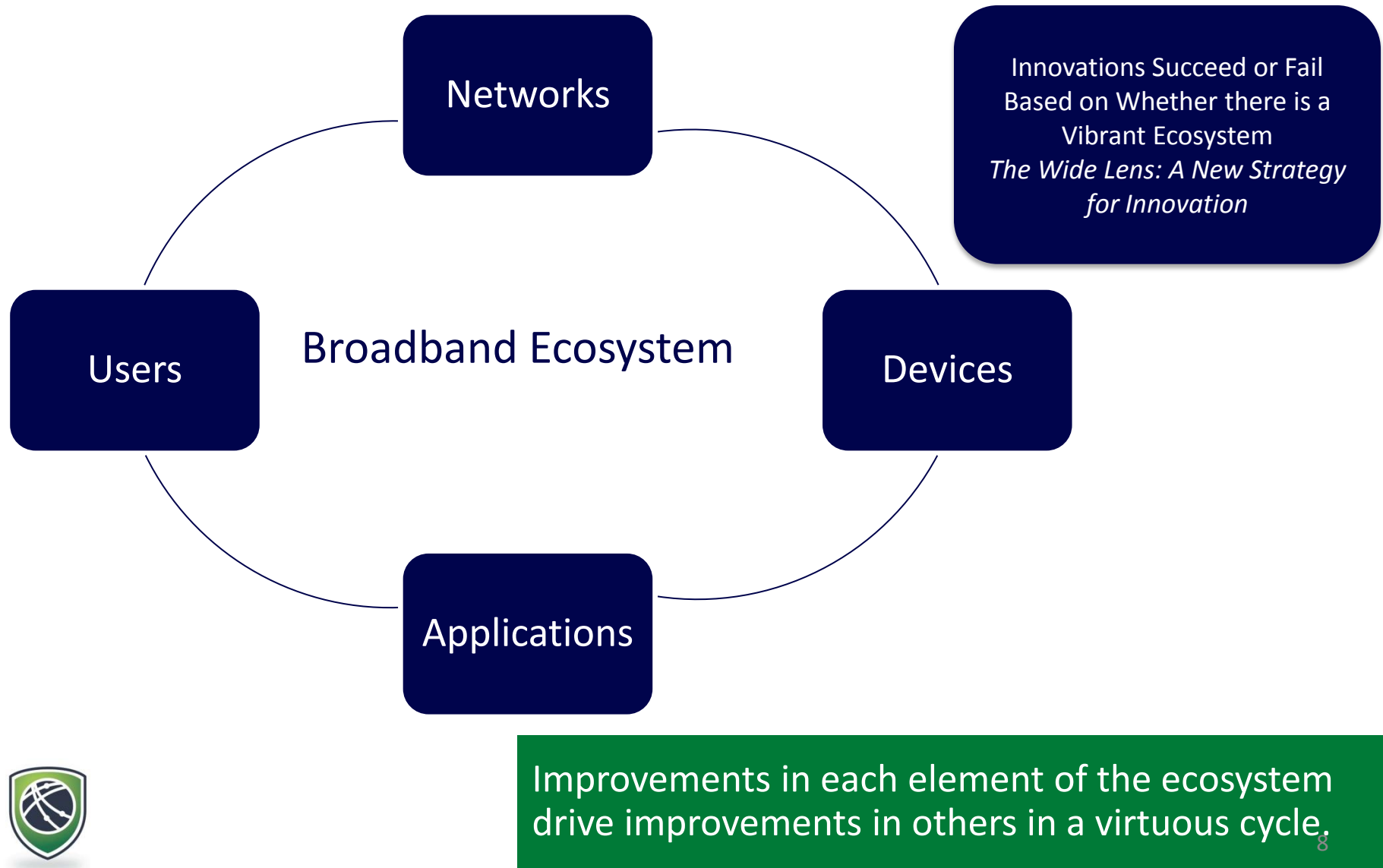
Transformed by Three Big Technology Trends



***Changes in inputs now enable high-performance knowledge exchange that will be key to success in the 21<sup>st</sup> Century economy***



# Broadband, the common platform for knowledge exchange, is fueling the Big Data Revolution



# Other countries are not waiting to upgrade

Other countries investing in Gigabit connectivity through policy driven actions . . .

## ***“Home Internet May Get Even Faster in South Korea”***

By Mark McDonald, February 21, 2011

South Korea already claims the world’s fastest Internet connections — the fastest globally by far — but that is hardly good enough for the government here.

By the end of 2012, South Korea intends to connect every home in the country to the Internet at one gigabit per second. That would be a tenfold increase from the already blazing national standard and more than 200 times as fast as the average household setup in the United States.

## ***“Cheap, Ultrafast Broadband? Hong Kong Has It”***

By Randall Stross, March 5, 2011

Hong Kong residents can enjoy astoundingly fast broadband at an astoundingly low price. It became available last year, when a scrappy company called Hong Kong Broadband Network introduced a new option for its fiber-to-the-home service: a speed of 1,000 megabits a second--known as a “gig”-- for less than \$26 a month. In the United States, we don’t have anything close to that. But we could. And we should.

. . . Others with Gigabit networks include Japan, Sweden, Spain, Turkey



# Research facilities are moving to 100 Gbps connections

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***“National LambdaRail provides 100 Gigabit Connection for NOAA at Supercomputing 2011. Next Generation Research Capabilities Will Be Demonstrated Using Cisco Technology and NLR Transport Network”***

By Bizjournals.com, November 7, 2011

***“Research institute deploys 100 Gigabit Ethernet from core to closet”***

By Shamus McGillicuddy, November 28, 2011



We know big data devices, like genetic sequencing machines, will create bottlenecks ahead...

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## ***“DNA Sequencing Caught in Deluge of Data”***

By Andrew Pollack, New York Times, November 30, 2011

BGI, based in China, is the world's largest genomics research institute, with 167 DNA sequencers producing the equivalent of 2,000 human genomes a day.

BGI churns out so much data that it often cannot transmit its results to clients or collaborators over the Internet or other communications lines because that would take weeks. Instead, it sends computer disks containing the data, *via FedEx*.



Other emerging big data devices include robots and 4K cameras

# **THE DIFFICULT MATH FOR THE NEXT AMERICAN UPGRADE**

The lack of the prospect of an upgrade is not the fault of the companies....

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....it is a simple matter of math:

For the investor in the networks, the math usually doesn't work



Two basic equations---First, while benefits flow to many...

Benefits accruing to:

- **Investor in the network**
- *Content and applications*
- *Equipment and devices*
- *Local community*
- *The region*
- *The country*



***Total  
benefits***  
of  
high speed  
networks

...the only benefits that matter for the investment case are  
the benefits that matter to the investor.



## Second equation---

The returns for the investor do not justify the investment

For the investor, the current equation looks like this:

Costs

Benefits

$$C + O > (1-r)R + SB + (-CL)$$

C – Capital Expenditures

O– Operating Expenditures

r – Risk

R- Revenues

SB- System Benefits

*(Benefits that drive increased revenues outside the communities where the new or incremental investments are made.)*

CL- Losses due to competition





Meaning, there will be no upgrade unless.....



# CHANGING THE MATH

# The path forward: change the math


$$C + O < (1-r)R + SB + (-CL)$$




But how?



# Focus on what other parties can do

- Investor in the network
- Content and applications
- Equipment and devices
- Local community
- The region
- The country



Can help understand the math,  
but difficult to change it



Other beneficiaries,  
particularly local communities,  
can dramatically affect the  
math of the provider



This coalition is similar to the kind of  
community organizing that economic  
development coalitions commonly do

# Historically, investments are made when policy alters equation

Sector /opportunity	Ecosystem change	CapEx	OpEx	Risk	Revenue	Competitive Losses
Telco	Grant of monopoly			Lower	Raise	
Cable	Grant of monopoly, pole attachment law, compulsory broadcast license	Lower	Lower	Lower	Raise	
Rural areas	USF	Lower	Lower		Raise	
Wireless	Limited # of licenses			Lower	Raise	
DBS	Limited # of licenses, program access			Lower	Raise	
Broadband upgrade	Deregulation, two wire policy, program access				Raise	Raise
Wireless upgrade	More licenses, lowered TAC, oversight of siting authority		Lower		Raise	Raise
Broadcast television to digital	Provide 2 <sup>nd</sup> channel for transmission of content	Lower		Lower	Raise	



Which, as the Google fiber project demonstrates, is also within the power of the local community

Sector /opportunity	Ecosystem change	CapEx	OpEx	Risk	Revenue	System Benefits
Google	Deals with City, State, and Utilities	Lower	Lower	Lower	Raise	Raise

Which is also what the University of Maine/Orono/Old Town did and other Gig.U communities are in the process of doing



# Community efforts can change the math

## Reduce Cap Ex

- Build to Demand Model
- Access to ROWs, Facilities
- Reduce Regulatory Time

## Reduce Op Ex

- Access Payments
- Reduce Ongoing Regulatory Costs
- Utilize Existing Billing Platforms

## Reduce Risk

- Build to Demand
- Standardize Functions Across Areas, Vendors

## Increase Revenues

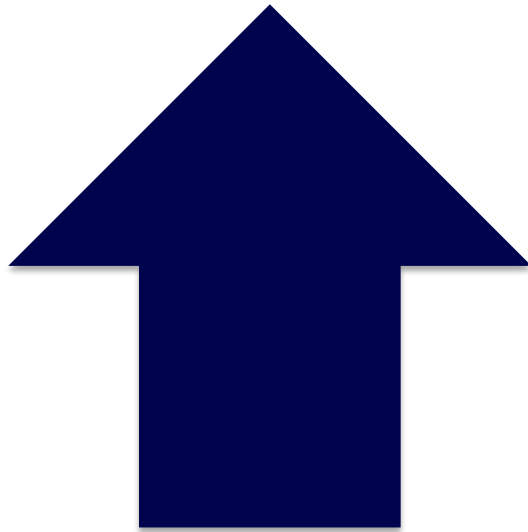
- Demand Acceleration
- Marketing Platform
- New Services

## Increase Ecosystem Benefits

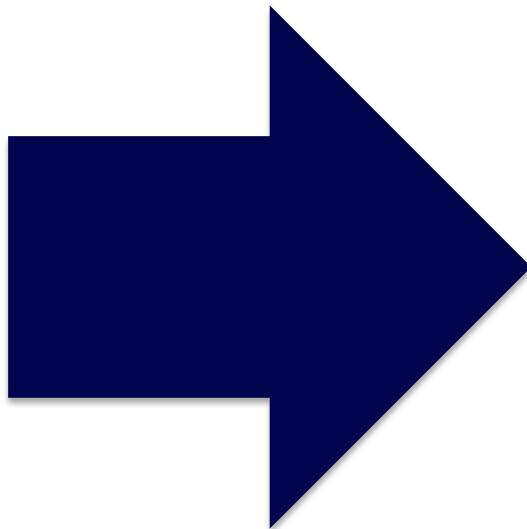
- Distributed Innovation
- Seeding Long-Term Growth



# Asymmetry: key to changing the math in local policy



Large out of pocket  
dollar benefits for  
provider



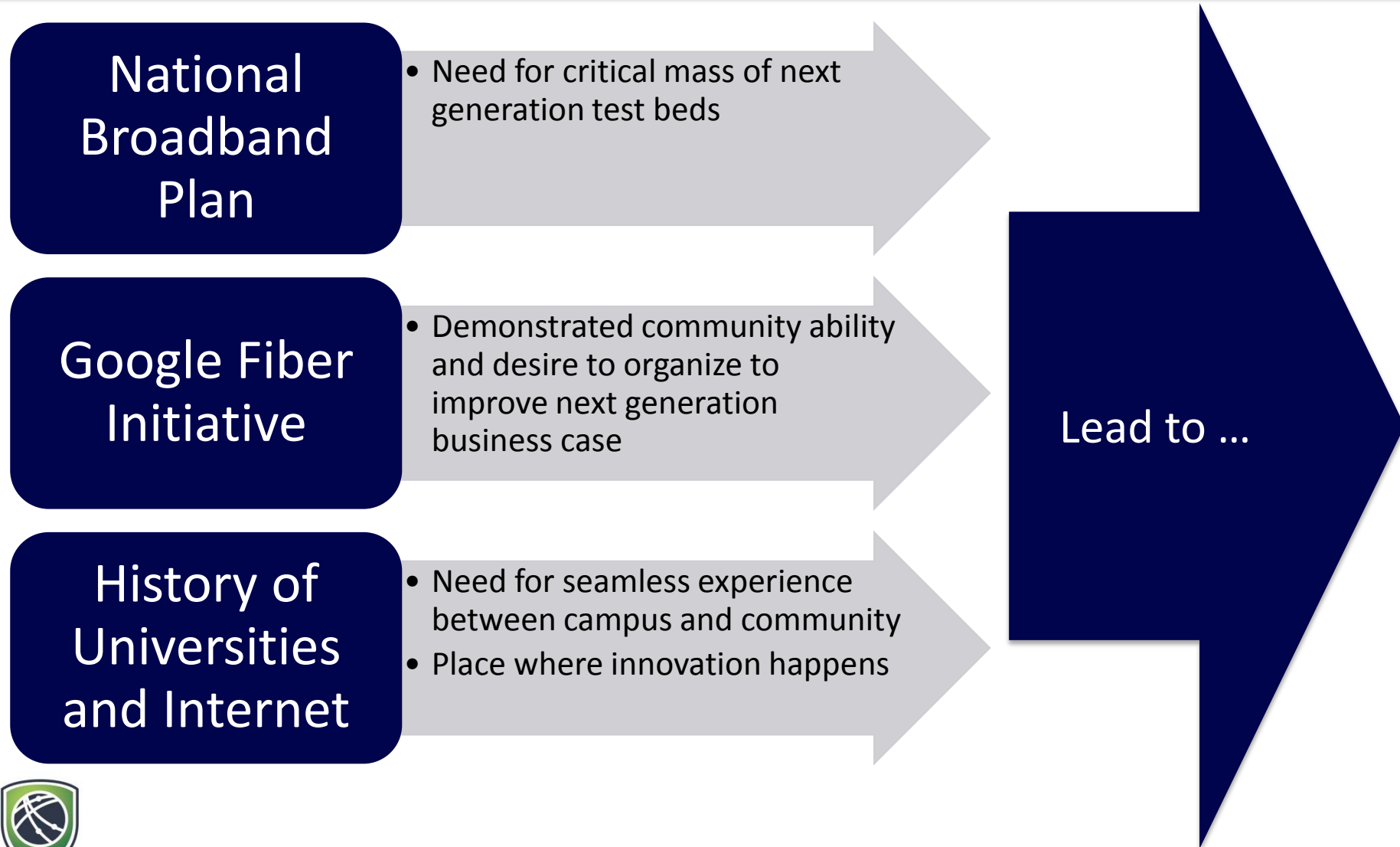
Very small out of  
pocket costs to  
community  
institutions



# **BACKGROUND AND STATUS OF GIG.U**



# Background for Gig.U



To move ahead fastest, focus on communities where math is easiest and impact is greatest

Private investment gap smallest in university-communities

Demand for  
Bandwidth  
=  
**Greatest**

Cost of  
Deployment  
=  
**Least**

Positive Impact  
of Network  
Access Due to  
Innovation  
Culture and First  
Major Use Case  
(Health Care)  
=  
**Greatest**



# The University Community Next Generation Innovation Project

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Over the summer of 2011, 37 leading research universities, in partnership with their local communities, formed Gig.U

## Our Mission

- Accelerate the deployment of world-leading, next generation networks and services in the United States

## Our Strategy

- Use university communities as test beds

## Our Tactic

- Engage the broadband community in a dialogue that reveals ways to change the math



# What we learned

Any community that wants its residents to have access to a Gig can do so

- The barrier is not technology or economics
- The barrier is organization; specifically, organizing demand and the better use of underutilized assets

University communities have the greatest motive and easiest organizing task

- Big data communities have the greatest existing demand and as high bandwidth-based enterprises are born, they will want to locate there
- University communities have the assets and organization tools best suited to the task



## NEXT STEPS

# A Plan for an American Upgrade in a Single Slide

Organize those who benefit, but are not part of the investment equation...

**Content and applications**  
**Equipment and devices**  
**Local community** (*particularly those with the best economics and innovative cultures*)  
**The region/state**  
**The country**

...to change the math...



$$\begin{array}{ccccccc}
 & & & \uparrow & \uparrow & \uparrow & \\
 C + O & < & (1-r)R + SB + (-CL) \\
 \downarrow & \downarrow & \downarrow & = & & & 
 \end{array}$$

...and thereby produce a strategic bandwidth advantage.

# For Gig.U and its members: local action; national support

## Local Steps

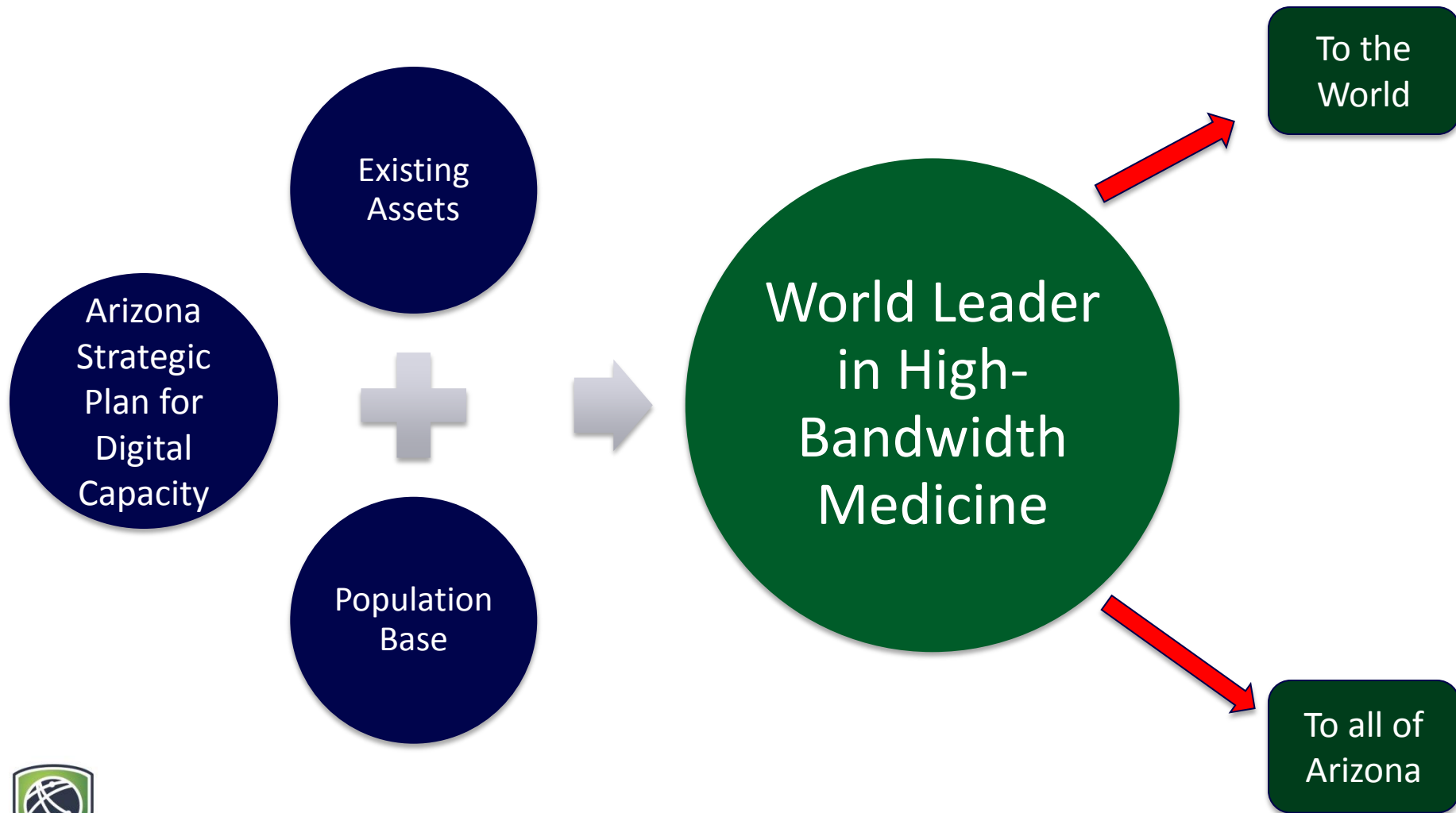
- Local Assessments
  - Assets
  - Mappings
  - Opportunities
  - Demand Aggregation
- Best Options

## National Steps

- National message
- Collective support for local preparation
- Collective support for community engagement and data analysis
- Collective support for competitive process
- Informational support for transactions



# For Arizona, a clear opportunity





# Closing Thoughts

- “The danger in times of turbulence is not the turbulence. It is to act with yesterday’s logic”

— Peter F. Drucker



# What in our country do we want to be the envy of world?

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...and what will it be?

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## 所美国大学筹备各自建立1Gbps网络社区“GigU”

*Headline from Chinese Newspaper day after Gig.U launch*

